SUBCONTRACT TITLE: **THE FABRICATION AND PHYSICS OF HIGH-EFFICIENCY CADMIUM – TELLURIDE THIN-FILM SOLAR CELLS**

SUBCONTRACT NO: **NDJ-1-30630-02**

QUARTERLY TECHNICAL STATUS REPORT FOR: Phase 3/Quarter 3

SUBMITTED TO: Ken Zweibel
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This progress report covers the third quarter of Phase 3 for the period March 1 through May 31, 2003 of subcontract # NDJ-1-30630-02 with the University of Toledo.

During this quarter, efforts continued on all three tasks: Cell Structure and Fabrication, Cell Modeling, and Characterization of Materials and Devices. In particular considerable emphasis was placed in Task 1 on the fabrication of CdS/CdTe cells in the substrate configuration as well as studies of grain boundary effects. In Task 2, much of the effort was placed on understanding the effects of buffer layers between TCO and CdS layers and their influence on stability and their relationship to back-contact doping. In Task 3, effort continued on the interpretation of x-ray fine structure data reported last quarter with *ab initio* FEFF analysis, AFM studies of superstrate and superstrate cells, and PL studies on ion-implanted crystalline CdTe and sputtered films before and after $CdCl_2$ treatment.

Given that the final report for this subcontract is due next quarter, this quarterly report will not elaborate further on details of the work in progress.

During this quarter an invited paper was presented by the P.I. at Symposium A "Amorphous and Nanocrystalline Silicon Science and Technology—2004" of the Spring MRS meeting in San Francisco (April 12-16, 2004). The paper was titled: "The Status of and Challenges in CdTe Thin-Film Solar-Cell Technology" and will appear in the MRS Proceedings. It is attached to this report.

Also during this period, an oral presentation was given by the P.I. at the European MRS meeting in Strasbourg (May 24-28, 2004) at Symposium O "Thin Film Chacogenide Photovoltaic Materials." This paper was titled: "Cu K-Edge X-ray Fine Structure Changes in CdTe with $CdCl_2$ Processing." A draft of this paper is attached to this report.

Finally, the P.I. also participated in the workshop on "Polycrystallinity in CIGS Thin-Film Solar Cells" organized by Rommel Noufi and Uwe Rau.

Attachment 1: Alvin D. Compaan, "The Status of and Challenges in CdTe Thin-Film Solar-Cell Technology" to appear in Mat. Res. Soc. Symp. Proc. **808**, ed. by R. Biswas, G. Ganguly, E. Schiff, R. Carius, and M. Kondo.

Attachment 2: Xiangxin Liu, A.D. Compaan, and Jeff. Terry, "Cu K-Edge X-ray Fine Structure Changes in CdTe with $CdCl_2$ Processing." (preprint, submitted for publication in J. Thin Solid Films.)